

EARLY CHILDHOOD DEVELOPMENT: IDENTIFYING SUCCESSFUL INTERVENTIONS AND THE MECHANISMS BEHIND THEM

1. Introduction

It is well established that the first five years of life lay the basis for lifelong development. However, during this vital period many children in developing countries are exposed to poverty, malnutrition, illnesses, and un-stimulating home environments. These factors are likely to have a detrimental effect on children's cognitive, motor, and social-emotional development, as well as on their health, thus prohibiting them from reaching their full developmental potential (Grantham-McGregor et al. 2007). In particular, children growing up under these circumstances are likely to have poorer health, lower school achievement and lower earnings potential. As adults, they are less likely to provide adequate stimulation and resources for their children, thus contributing to the intergenerational transmission of poverty and economic inequality (Sen, 1999).

This period of early childhood is therefore a critically important one for intervention (Nelson, 2000). Recent research provides evidence that interventions in this period are not only extremely important for brain and physiological development, but can also be feasible and relatively cost-effective (Heckman and Masterov, 2005). The most effective interventions provide direct learning experiences to children and their families (Engle et al. 2007). An example of such interventions is weekly home visits by well-trained professional personnel who interact with mothers and children (see Grantham-McGregor et al. 1991 on an intervention in Jamaica). However, they can be expensive in absolute terms, and may require human resources that may not be available on a large scale.

An important research and policy agenda is therefore to identify cost-effective, feasible and sustainable interventions to promote early childhood development (ECD) in conjunction with healthy nutritional status. We are particularly interested in understanding whether pre-existing resources and links in the community can be mobilised and exploited as a mean of implementing interventions that foster ECD. In this research, we propose to design, implement and measure the effectiveness of an intervention using pre-existing community resources. We will also compare it to another more conventional and less intensive intervention, using a randomised trial framework. We will then go on to address *why* a particular intervention works or not, in order to understand the constraints that very poor households face when making choices relevant for their children's development.

2. Background information: *Familias en Acción*, a conditional cash transfer programme

We will implement these interventions in Colombia, a country in which several new welfare programmes were implemented in 2002, following a sharp economic downturn, which affected severely the poorest sectors of society. The largest of these programmes was a conditional cash transfer (CCT) programme *Familias en Acción* (*FeA*), which not only survived the change of government in August 2002, but also became the flagship of the new government's social policy. The programme covered about 400,000 households in its first phase, which was mainly targeted to rural communities and small towns. In 2007 it was expanded on a large scale to cover approximately 1.5 million households, or around 15% of all households in Colombia. We will exploit the existence of this programme in order to facilitate the implementation of the interventions we propose.

FeA provides cash transfers to mothers in poor households conditional on certain activities relating to the accumulation of their children's human capital. In particular, children below the age of 7 are required to be taken by mothers to health and development check-ups three times per year. During these visits, mothers also receive advice on health practices. School-aged children are required to attend school regularly.

Another aspect of this programme is that all beneficiary mothers are encouraged to attend regular meetings together, during which they discuss issues relating to their children's health

and education. During these meetings a *madre lider* (mother leader) is elected from around 50 beneficiary mothers. She co-ordinates various programme activities and acts as a direct link between the programme administrators and beneficiaries. These meetings are important for our research for at least two reasons. First, they are a key channel through which community links have been forged and/or strengthened. Second, they provide a setting that we exploit, in ways described later, to implement the proposed interventions.

A thorough evaluation of the impact of the programme was conducted between 2002 and 2006 by some members of this research team. Some important successes included the improvement in the nutritional status of children (as measured by height per age), and some health outcomes (such as reductions in the occurrence of diarrhoea), particularly in rural areas. It also increased attendance in secondary school (Attanasio et al. 2005, 2006; Lagarde et al. 2007). Some limitations were also identified. For instance the impacts in urban areas have been limited and there is no evidence that the programme had any effect on the prevalence of anemia among children below the age of 7.

3. The proposed interventions

We will exploit the presence of *FeA* to set up and implement two interventions with the aim of improving the cognitive development of young children, and estimate their effectiveness within a randomised trial. We will implement two interventions as it is not clear *ex-ante* which forms of delivery are more effective. The first, and more intense, involves weekly home visits to mothers and their children over an extended period. The second involves expanding the health care visits that beneficiary mothers already attend.

The target population will include children aged 6 to 18 months at the beginning of the intervention, who live in rural areas. We will follow them for 24 months, so that by the end of the intervention they will be between 30 and 42 months. This age group has been chosen for a number of reasons. First, compared to older children, it is believed to be more promising in terms of the impacts on cognitive development. Second, it is advisable to have a relatively homogeneous target population. Third, children living in poverty begin to develop deficits in cognitive and language development and social behaviour at this stage (Schady and Paxson, 2005). Fourth, nutritional status, which is strongly related to children's development, deteriorates faster in this age range (Shrimpton et al. 2001). Our focus on rural areas is due to the fact that they represent a more homogeneous environment in which there is an acute need for better cognitive development. Urban areas pose a different set of challenges that merit a separate study.

The administration of *Familias en Acción* has expressed an interest in developing a component of the programme to provide psycho-social stimulation to very young children. They have also agreed to work with us throughout this research project.

3.1 Intervention I: Home visits by trained community women

Trained women from the community will make individual weekly home visits to beneficiary mothers of children aged 6 to 18 months (at the time the intervention starts), for a period of two years. Emphasis will be placed on improving maternal-child interaction and on using everyday child care activities and household tasks to teach the child new words and concepts. During the visits, the visitor will interact with the beneficiary mother and her young child and will demonstrate play activities using home-made toys and objects around the home. She will also discuss child development and emphasise the importance of chatting and playing with the child, using positive reinforcement and not physical punishment.

The home visitors will be recruited from around 50 women in the meetings attended by beneficiaries of *Familias en Acción* (note that a pre-existing *madre líder* may become a home visitor). They will receive training from us over two weeks and will be paid a small stipend to

carry out the home visits. Between 5 and 10 beneficiaries, who are mothers of children in our sample, will be assigned to each visitor.¹ The material and the protocols that will be used in the home visits and the training will be based on the well-known and highly successful Jamaican study (see Grantham-McGregor et al. 1991; Walker et al. 2005). We will include traditional games, songs and play materials used in the region and suitably adapt the curriculum to our context. The visitors will keep records of each visit and will meet every two weeks with the local programme co-ordinator to discuss the visits and any problems that arise.

This intervention, which is the core of the proposal, has a number of attractive features. First, it will deliver services - home visits to enhance the stimulation of infants - that have been shown to be effective in other contexts. Second, it will exploit existing community resources and the networks created as a by-product of another intervention in order to deliver these services. The harnessing of community resources, knowledge and networks has been shown to be effective in other settings. For example in rural Nepal, an intervention based around the organisation of groups of local women has reduced infant mortality (Manandhar et al. 2004).² Moreover, delivering services via pre-existing networks is more affordable than having them delivered by specialised personnel over a long period. So evidence that this intervention is effective could be very useful in many contexts - not only in environments where CCT programmes operate, but also in communities with close ties among people, as in many developing countries.

3.2 Intervention 2: Expanded health care visits

Expand the growth and development check-ups attended by beneficiaries of Familias en Acción to include advice from health centre staff on child cognitive development and the importance of stimulation in fostering it. In addition, material such as information leaflets on child stimulation will be provided to mothers during the visits.

Two weeks training will be provided to health centre staff for this. This intervention was tried out by the programme administration in a small pilot in two urban settings as well as in a rural one in 2007, but has not been evaluated in any systematic fashion.

This intervention is considerably less intense (and less expensive) than the first one. It is likely to be effective however, if mothers' lack of knowledge and information is the main reason behind under-investment in ECD.

3.3. Adding a nutrition component to the interventions

The two stimulatory interventions proposed above will be complemented by the provision of a nutritional supplement to half of each group.

Many of the children that will be the focus of the study are malnourished.³ Moreover, the CCT programme through which we are planning to implement the interventions has had only modest (no) effects on nutritional status (anaemia). It has been amply documented however, that nutritional deficiency affects negatively and significantly cognitive as well as physical development (see Walker et al. 2007). There is also evidence that improving nutrition has positive effects on children's health and physical and cognitive development, particularly for children under 3 (Martorell, 1995; Maluccio et al. 2006; Walker et al. 2007).

¹ Whether one or two home visitors will be elected will depend on how many mothers in the meetings have children in the age group we focus on.

² Similar interventions, based on the idea of catalysing community resources are currently being studied in many different situations, such as Malawi and India (Rosato et al. 2006, Fernandez and Osrin, 2006).

³ According to the 2005 Colombian Demographic and Health Survey, among children below the age of 5 in households in the bottom 20% of the income distribution, 20% are stunted in growth, 42% suffer from anemia, and 17% have suffered from diarrhoea in the two weeks prior to the interview. Only 58% of children aged below the 2 years have obtained all of the recommended vaccinations, and only 63% of children of the same group have consumed food rich in vitamin A in the three days prior to the interview.

For these reasons, we intend to provide a nutritional supplement to a subset of our treated sample. The supplements will be in the form of nutritional 'sprinklers'. These are a colourless, tasteless powder that provide a range of micronutrients, and are administered by being sprinkled on semi-humid food (such as rice). Additional details are contained in Appendix 2. An important advantage to the use of sprinklers compared to calorie based supplements is that they are not perceived as 'food' and are therefore mostly given only to the children to whom they are targeted. Calorie based supplements on the other hand, are often misused, either by being used as replacement meals or by being shared across the family thus depriving targeted children of the full effect. Furthermore, recent studies have emphasised the need for micronutrient support rather than calorie supplementation (Adato et al. 2000; Bonvecchio et al. 2007; Uauy et al. 2001). Moreover, the evidence on the effect of micronutrients such as sprinklers on cognitive development is still limited, and this study will provide important new evidence on this.

As we will have two 'stimulation' treatment groups and a control group, the introduction of the nutritional supplement will effectively mean that we have six different groups: interventions 1 and 2 with and without nutrition, nutrition only, and no intervention. This strategy will enable us to disentangle the effect of nutritional supplements and of the two cognitive development interventions and their interactions.

3.4 Summary

The set-up provides us with a unique opportunity to advance knowledge in an area that is of extreme importance. The key objective of the study is the identification of interventions that are both effective at improving the cognitive development of children and affordable due to the exploitation of resources and networks already available in the community, possibly in connection with an ongoing welfare programme. This analysis, especially if complemented by an analysis that uses behavioural models of the incentives and mechanisms underlying the results, can be extremely valuable in a variety of different contexts.

4. The evaluation

4.1 Evaluation design

The evaluation design will be based on a cluster randomised trial in which a target sample of poor households will be allocated randomly between the six groups mentioned above. We plan to have 20 communities in each group (120 communities in total). We aim to have 25 children in each community (the power calculations underlying this choice are contained in Appendix 3). Randomisation will take place across communities rather than within communities (randomisation within communities risks jeopardising the experiment as those randomised out could learn from those randomised in). The impact evaluation will be based on comparisons of outcomes between the treatment and control groups.

We will benefit from close collaboration with the programme administrators in the piloting of the interventions, working closely with them to identify the best strategy to build the randomised trial, given the institutional constraints. They will make the list of beneficiaries in the communities that will be included in the study available to us, and will instruct the local programme officials in the communities to co-operate with us throughout the experiment. The funds to pay the home visitors will go through the programme system of payments, which has proven to be efficient and transparent in the past.

4.2 Outcomes

Data measurement and collection will be a very important component of this research. We will administer two household surveys, one at the baseline and the other at the end of the intervention, 24 months later. They will gather information on a rich set of socio-economic and demographic characteristics as well as less standard variables such as children's food intakes including nutritional supplements (e.g. consumption of iron rich food), pre-school participation, maternal knowledge and information, and detailed time use of mothers and children, all of which will be important in understanding how the programmes work. In addition to the household

surveys, administered in the child home, children's development will be measured by trained psychologists in the health centres where children receive growth and development check-ups.

The main outcome variables of interest are the development and nutritional status of children, the measurement of which will be a very important part of this research. These are listed below.

1. Children's motor and mental development. This will be assessed using either the Bayley Scales of Infant Development or the Griffiths Mental Development Scales⁴, as well as the World Health Organization (WHO) Milestones for gross motor development.
2. Children's language development. This will be assessed by a maternal report using a Spanish adaptation of the short version of the MacArthur Language Inventory (Fenson et al 2000; Jackson-Maldonado et al. 2003).
3. Children's nutritional status. This will be measured by collecting height and weight, haemoglobin levels (using haemocubes), and children's consumption of iron rich food. We will also collect data on de-worming treatments.
4. Time use. This will include detailed information on who has spent time with the child during the previous day and for exactly how long.

It should also be noted that this study would provide the basis for subsequent investigations that could track the same children when they reach school age. We will therefore collect addresses of relatives and friends who would know the whereabouts of the interviewed family in the future, if needed.

We will also measure outcomes relating to beneficiary mothers, including

1. Stimulation in the home. This will be assessed using a modified version of the Home Observation for the Measurement of the Environment (HOME) (Caldwell and Bradley 1984). This will be used as an outcome measure but will also be examined as a possible mediator of any improvement in child development.
2. Maternal knowledge of child rearing practices. We will collect information on the mother's knowledge about nutrition and cognitive stimulation, and her beliefs regarding the importance (short- and long-run) of nutrition and cognitive stimulation for children's development.
3. Maternal depressive symptoms. These will be assessed using a modified version of the Centre for Epidemiological Studies Depression (CESD) Inventory. This inventory has been used in many studies worldwide.⁵
4. Time use data. Detailed data on female labour supply, time carrying out household tasks, and time spent with the child.

Further details of the preceding data collection are contained in Appendix 1.

5. Identifying the mechanisms

Our research will also shed light on *why* the interventions work (or not) as well as on the reasons for low investment in human capital by poor households.

There are several channels through which the intervention can affect ECD, including (1) reduced prevalence of anemia (2) increased awareness about the importance of stimuli, which may mean that mothers spend more time with their young children (3) acquired knowledge on good stimulation practices, which may mean that mothers are more efficient in the production of

⁴ The research team includes experts who have worked on these types of programme and who have valuable experience on a variety of indicators. We will work extensively in the design and piloting phases to identify measurements that are appropriate for the age groups we consider. We will carry out pilots to decide which scale is more appropriate in our context. While we will use internationally standardised tests, we will pay attention to the specific cultural context in which we will be operating. Note also that inter-observer reliabilities and test replicability will be assessed for all measurements at the beginning of the study and 5% of all measurements will be observed by a second tester and scored independently throughout the study.

⁵ Maternal depression was shown to improve with similar home visiting in a small Jamaican study (Baker-Henningham et al. 2005).

children's cognitive development per unit of time spent with the child (4) increased awareness of mothers about the importance of early childhood development, which may lead them to make use of pre-school facilities in the village. Our rich data on beliefs, knowledge, and practices will allow us to test these hypotheses and to ascertain which are more important in our setting.

For instance, if mothers understand the intervention but are seriously constrained by time at work, they will not increase time spent with the child but only the efficiency of the time spent with him/her. Female labour supply may also be affected by the intervention.⁶ On the one hand, it may decrease if the intervention increases the time that mothers spend with their child. On the other hand, it may increase if mother's mental health improves, leaving her in a better position to work. Increases in labour supply may bring about increased food consumption that may improve child nutritional status even in the absence of nutrition supplementation.

We will also ask whether the presence of non-convexities in the human capital production function lie behind low levels of human capital investments. The interaction between iron supplementation and the two interventions could be positive either for biological reasons (iron deficient anaemic children are more tired and less active than non-deficient children (Lozoff et al. 1998) and maybe unable to fully utilise the intervention), or because mothers spend more time with the child, as they realise that their investment now has an extra return, due to the supplementation. In the absence of iron supplementation, they might be spending less time with their children because poor nutritional status prevents children from improving, independently of stimulation. Non-convexities in the human capital production function have strong implications as they create poverty traps, and intensive public intervention is required.

These examples show that the investment processes through which poor households make decisions that have important consequences for both the short- and long-run development of their children, are complex and affected by many factors, such as available resources, knowledge, the environment and markets available to households. Our research, and in particular the exogenous variation induced by the experiment and the rich data we will collect, will allow us to construct and estimate models of individual investment behaviour that will help distinguish among different hypotheses about the nature and origin of the effects we observe.

We will disseminate our research findings to academics through seminars and papers. We expect to publish academic papers in top-ranked peer-reviewed journals. We will also write policy reports and will organise conferences to inform policymakers on the impacts of these interventions on early childhood development and on *why* a particular intervention works or not.

6, The research team

The evaluation team will be made up of the following groups: (i) researchers at the Centre for the Evaluation of Development Policies (EDePo) directed by Professor Orazio Attanasio. The research project will be run and managed by senior research economist Emla Fitzsimons, who has worked extensively on the *Familias en Acción* programme (ii) researchers at the International Centre for Child Development at University College London, and in particular Professor Sally Grantham McGregor, an internationally renowned expert in early child development and nutrition (iii) Camila Fernández, a psychologist based in Bogotá, Colombia, who has expertise in language development and social cognition (iv) Emanuela Galasso, a research economist at the World Bank, who has extensive experience with similar interventions in different countries such as Ecuador and Chile (v) Ian Forde, a public health specialist with in-depth knowledge of health and nutrition issues. The logistics will be co-ordinated by the management of the programme *Familias en Acción* in Bogotá. Professor Attanasio directed the impact evaluation of the programme *Familias en Acción* and has developed a unique knowledge of the programme as well as an excellent working relationship with the programme administrators.

⁶ In the *Familias en Acción* sample, 19% of children aged 6 to 18 months have a mother who works for pay.